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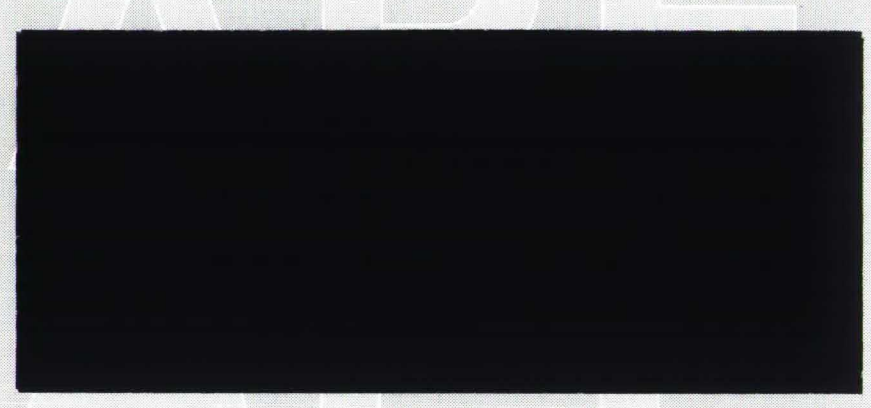

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PAPER

Modern Reproductive Innovations: Implications for Fathers and Children

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Abstract

Recent technological developments such as in vitro fertilization, artificial insemination, embryo transfer, and the DNA fingerprinting technique that tests for genetic associations between parents and children, in combination with biosocial innovations, most notably, sperm banks and the practice of surrogacy, have prompted challenges to the basic assumptions about the reproductive process, definitions of family, and the link between biological and social fatherhood in industrialized countries. My major objective in this essay is to assess what types of implications these innovations are likely to have for fathers and their children. I develop my analysis by first noting how these reproductive innovations, coupled with behavioral and attitudinal trends, are shaping an important moment in the history of fatherhood in western, industrialized countries. I then draw upon my conceptual framework (Marsiglio, 1991) that focuses on men's relationship to the reproductive realm to assess two sets of timely issues related to modern reproductive technologies and fatherhood. The first set of issues involve those technologies that enable a woman to bear children without having intercourse with a man. I also consider the significance of the new DNA fingerprinting technology that provides health care specialists with the means to identify biologically associated parent-child pairs.

Introduction

Recent technological and biosocial innovations[1] in the reproductive field have raised new and fascinating questions for scholars and health care providers interested in fertility issues (Edwards, 1991; Issacs & Holt, 1987; McNeil, Varcoe, and Yearley, 1990; Delaisi de Parseval & Hurstel, 1987). Technological developments such as in vitro fertilization (IVF), artificial insemination (AI),[2] embryo transfer (ET),[3] and the DNA fingerprinting technique that tests for genetic associations between parents and children,[4] in combination with biosocial innovations, most notably, sperm banks and the practice of surrogacy,[5] have prompted challenges to the basic assumptions about the reproductive process, definitions of family, and the link between biological and social fatherhood in industrialized countries.

While these innovations are responsible for only a small proportion of all conceptions and births, their use has increased steadily since their development. It has been estimated that as of the mid-1980s there were over 270 IVF clinics worldwide with at least 100 located in the United States and France, respectively. The number of children born through this technique is thought to be doubling each year (Laborie, 1988). Even more impressive is the number of women who make use of AI technology. At least 170,00 women are artificially inseminated every year in the United States and the practice is common in other industrialized countries as well (Office of Technology Assessment, 1988, cited in Edwards, 1991). The success rate for this technique has been estimated at 80% (Shaman, 1980). Edwards (1991) speculates that interest in this technique will continue to grow around the world. It provides a viable option to persons with various needs including those who have become less fertile or infertile due to exposure to hazardous environmental materials or medications, as well as those persons who want to have input in the genetic makeup of their child.

My major objective in this essay is to assess what types of implications these innovations are likely to have for the social or legal fathers and their children. I develop my analysis by first noting how these reproductive innovations, in conjunction with behavioral and attitudinal trends, are shaping an important moment in the history of fatherhood in western, industrialized countries. I then draw upon my conceptual framework (Marsiglio, 1991) that focuses on men's relationship to the reproductive realm[6] to speculate about two sets of timely issues related to modern reproductive technologies and fatherhood. The first set of issues involve those

technologies that enable women to bear children without having sexual intercourse. I also consider the significance of the new DNA fingerprinting technology that provides health care specialists with the means to identity biologically associated parent-child pairs.

Modern Reproductive Innovations: Another Significant Historical Moment?

To understand the impact these reproductive innovations may have on fathers and children in industrialized countries, it is useful to clarify briefly how they represent a significant development in the history of fatherhood. In prehistoric times, male Homo sapiens did not recognize that they were in some cases the father of the children born to females with whom they had coitus--they were essentially oblivious to their role in the pregnancy process. Reiss (1986) has speculated that the physiologically gratifying experience of copulation, not knowledge of one's paternity, first lead some males to bond with a female partner and to develop feelings toward their partner's offspring. Early forms of social kinship may have evolved because of this process even though males did not comprehend the technical details of the reproductive process. It is also possible that they may have extended their protective services and nurturing care to children born to their favourite partner(s) even though, unbeknownst to them, the children may have actually been sired by another male. Unfortunately, we can only conjecture about these processes and how males came to develop conscious perceptions about their "paternal" roles.

We do know that men eventually developed a more accurate understanding of the reproductive process. The discovery of biological paternity by persons who could subjectively evaluate its significance was a remarkable moment in the history of humankind, the reproductive process, and the social construction of fatherhood (O'Brien, 1981). O'Brien (1981) has argued that these early men experienced a dilemma because they had a crude sense that babies were created through coitus but they were physiologically detached from the gestation and labor process, which in turn made the establishment of paternity problematic. They had no way of being absolutely certain that a child was in fact their child. Documenting one's paternity was an act of personal faith reinforced by community cooperation. O'Brien goes on to assert that men's efforts to develop an ideology of continuity that linked fathers to their offspring necessitated that they develop social and legal institutions such as marriage in order for them to lay legal claim

to their children. This practice connected the biological paternity of children and social fatherhood with men's marital relationships. Men were in a sense indirectly appropriating "their" children by asserting their paternal rights vis a vis their legal relationship with, and ownership of, "their" children's mother.

Today, we are in the midst of another important moment in the social construction of fatherhood even though it is unlikely to have the same type of revolutionary consequences. The distinctive nature of this period is based on several interrelated behavioral, cultural, and technological developments. Many societies, especially western industrialized ones, have experienced significant changes in their childbearing, marriage, divorce, and remarriage patterns. One consequence of these patterns relevant to the present discussion is that growing numbers of men at some point in their life are assuming father-like roles to children who are not biologically related to them (Glick, 1989; Hernandez, 1988; Marsiglio, 1992). The cultural scenarios pertinent to fatherhood in general, or the stockpile of ideas related to how persons should and do express particular paternal roles, have become more varied. As a result, there is a greater diversity of paternal roles and the general definition of fatherhood has become more expansive (Marsiglio, forthcoming; see also LaRossa, 1988).

These sociodemographic and cultural trends have prompted a series of lively academic and public debates that explore the definition and nature of "family" and kinship as well as the meaning of "fatherhood" (see Bentler, Burr, Bahr, & Herrin, 1989; Delaisi de Parseval & Hurstel, 1987; Edwards, 1989; Jurich, 1989; Menaghan, 1989; Seligman, 1990; Scanzoni & Marsiglio, 1991; 1993; Scanzoni, Polonko, Teachman, & Thompson, 1989). Laypersons are slowly changing their perceptions about the meaning of "family" in industrialized countries. Consequently, questions that explore whether socially constructed relationships, including those produced through reproductive technologies, can be as thick or thicker than "blood" take on new meaning in this type of cultural climate.

These contemporary discourses are occurring alongside another remarkable shift in the nature of the reproductive process. Modern reproductive technologies can now separate biological paternity from sexual intercourse between heterosexual partners, and biological from social fatherhood.[7] These technologies are thus blurring the traditional images of "father," "mother," and "family relations" (Delaisi de Parseval & Hurstel, 1987; Edwards, 1991). Moreover, the

once privileged position of paternal claims based on biological relations is being challenged by those who feel that genetic fathers must demonstrate some threshold level of responsibility toward their children to retain their formal or informal rights. It should also come as no surprise that the practical value of social fatherhood is being accentuated in an era where divorce, single parenthood, and cohabitation are prevalent. At the same time, biological paternity is being highlighted in new a way due to recent developments in the DNA fingerprinting technique that can now establish with near certainty the shared genetic heritage of fathers and their children. This innovation is particularly useful for documenting paternity in an effort to hold biological fathers accountable for the financial support of their children.

Procreative Issues and Reproductive Innovations

In discussing how the specific innovations are likely to affect fathers and children today and in the foreseeable future, it is instructive to place men's involvement in the reproductive arena into not only a historical context but a theoretical one as well. Elsewhere, I have attempted to conceptualize men's experiences in this life sphere by developing two distinct and abstract social psychological concepts: *procreative consciousness* and *procreative responsibility* (Marsiglio, 1991).

The former concept refers to how men experientially relate to and perceive particular aspects of the reproductive realm. These experiences include both cognitive activity and emotional responses but they are largely distinct from men's sense of obligation or demonstration of the same in these areas. In its broadest sense, typical research questions of interest would include the following. How do men feel about their ability or inability to procreate? To what extent do men associate their procreative potential with their masculinity? How do men experience seeing a visual image of their fetus/child in the mother's womb? In what ways, if any, do men feel differently about their "social" child when he/she is conceived with donor sperm rather than their own sperm? What factors contribute to fathers' sense that their "social child" is an extension of themselves? To what extent and how do men develop aspects of their procreative consciousness vicariously through their association with their partner? How do men think and feel about their experiences with, or knowledge of, their partner terminating her (their) pregnancy?

The second concept, procreative responsibility, emphasizes men's involvement and sense of obligation in the areas of contraception, pregnancy resolution, fertility testing, gestation, and child support/child care respectively. It deals with both the practical aspects of these reproductive areas (e.g., using a condom) as well as men's perceptions about obligations they associate with the social roles of fatherhood (e.g., child support). Questions of interest would include: To what extent do men feel responsible for ensuring that contraception is used? When do men feel compelled to accompany and support their partner during an abortion procedure, pregnancy exam, or check-ups during gestation? Why are some men more willing than others to assume responsibility for initiating fertility testing? Do men feel obligated to assist with the financial support and practical care of children they beget, adopt, or with whom they coreside? Does their genetic relationship to the child affect aspects of their sense of procreative responsibility?

An important feature of the larger conceptual framework that incorporates these concepts is that men's views about reproductive issues, in conjunction with the interpersonal relationships they maintain, enable men to express their role identities (Stryker, 1980) as partner, father, and more generally a masculine, social male. Men often have the occasion to manage their presentation of self in an effort to have others perceive them to be a particular type of partner, father, or social male. Thus men express their role identities and experience the reproductive domain at the micro-level even though larger social forces, including public policies and cultural/subcultural norms, can affect men's everyday life experiences in this realm.

Men often develop beliefs, attitudes, and feelings about their role identities and reproductive issues independent of a particular partner and relationship. However, their orientation towards aspects of the reproductive realm can also be shaped by their involvement with a specific partner. A particular partner may persuade or "force" a man to consider her views and in the process reassess his perceptions of specific reproductive issues. This pattern underscores the dynamic nature to men's feelings and thoughts about procreative issues. Men are apt to change their views in subtle and dramatic ways throughout their life course. I do not assume that men will have some type of subjective awareness or integrated sense of self at any given point in time. Instead, my social psychological perspective emphasizes the dynamic and fragmented nature of men's procreative consciousness and sense of responsibility. In other words, men will typically not be fully aware or have a crystallized perspective on the various reproductive issues

at the same time. This is unlike, say, men who are quit cognizant of their approach to different aspects of life due to their Fundamentalist Christian perspective.

In Vitro Fertilization (IVF) and Artificial Insemination (AI)
Implications for Fathers

Men's procreative consciousness and sense of responsibility are likely to affect how they view reproductive technologies and their willingness to use them. For example, men who primarily want to beget a child to demonstrate their masculinity may be reluctant to become a social father by using donor sperm. On the other hand, those men who want to become a social father in order to experience the developmental phase of generativity, the interest in creating and guiding younger generations (Erikson, 1982; Hawkins, Christiansen, Sargent, & Hill, 1993), or to share in the childrearing experience with their partner, may be more willing to become a social father using whatever means necessary (Humphrey & Humphrey, 1988). Technologies associated with IVF and AI can also affect how fatherhood is culturally constructed, to some degree, and how individual fathers perceive their paternal roles. If technologies using donor sperm were to receive wide public acceptance they could enhance the legitimacy of social fatherhood and thereby expand the definition of fatherhood. These innovations can therefore influence aspects of fathers' procreative consciousness and sense of responsibility as well as provide them with opportunities for experiencing their relationship to the reproductive realm in novel ways.

Numerous factors will affect how these technologies affect fathers and children. The outcomes will be based in part on some combination of individuals' perceptions (these may vary over the course of the pregnancy and the child's life), interpersonal dynamics, and the specific fertility circumstances associated with the application of the respective technology.

Eight different permutations of how a man could be involved in establishing a paternal relationship to a child through IVF or some form of AI (AIH or AID) are displayed in Figure 1. For simplicity sake, my discussion assumes that the partners comprise a heterosexual couple. More lesbian and even gay men may avail themselves in the future to these alternative means of reproducing children, but an analysis of homosexuals' use of reproductive innovations is beyond the scope of this discussion. I also assume that the social father knows that his partner

is experimenting with an alternative form of reproduction even though in rare cases a woman might attempt to deceive her male partner and covertly use one of these technologies. I discuss how men are likely to differ in the way they experience aspects of their procreative consciousness and sense of responsibility due to the unique combination of fertility circumstances they encounter by using one of the reproductive innovations. Their experiences will probably affect as well as be affected by their tendency to develop a paternal identity.

Figure 1 About Here

The first four scenarios outlined in Figure 1 refer to men who use their own sperm to procreate. It seems reasonable to anticipate that men will tend to feel the fullest psychological and emotional intensity of being a biological father in the 1st case. In this instance, they use their own sperm to impregnate their partner who also uses her own ovum and carries the pregnancy to term. This set of fertility circumstances most closely resembles the natural reproduction process.

Those men who are represented by the 2nd and 3rd categories are probably very similar to each other and have experiences comparable to men in the 1st category. If differences do exist between men in the 2nd and 3rd categories they probably hinge on the potential distinction men make between the relative importance of using a partner's ovum versus the benefits associated with experiencing the gestation process with her. The symbolic significance of these options may be quite different. In either case, the man's partner makes a physiological contribution to the eventual birth of the man's genetically related child. It is possible that whatever differences men in categories 2 and 3 will experience may decline or be eliminated over time. The way a man develops and experiences his procreative consciousness and sense of responsibility during a pregnancy initiated by IVF or AI may differ from his experiences some time after the child is born when the child's and mother's physical appearance can be compared more realistically. Having one's partner contribute her ovum may be of little consequence to some prospective fathers during the pregnancy, but its importance may increase, for example, if one's nine year old daughter physically resembles one's partner. Concerns about the partner's genetic or gestational contribution will affect a father's procreative consciousness or procreative responsibility only if his paternity experiences are shaped vicariously, at least in part, through his association with a partner.

The circumstances that identify the 4th case, where the man uses his own sperm but his partner plays no biological role in the child's conception or birth, are likely to foster different feelings and perceptions among men than either of the first three permutations. These distinctions will be accentuated to the extent that men can develop their procreative consciousness through their association with their partner when she assumes the gestational mother role. As with the first three cases, this distinction may dissipate once the child is born. Much will also depend on how both the father and social mother develop and express their parental roles.

Case scenarios #5-8 represent examples of IVF and AI that involve donor's sperm. Generally speaking, social fathers in these situations are likely to experience their prenatal procreative consciousness differently than those men who contribute their own sperm. A variety of factors will affect the nature and extent of the differences between the procreative consciousness of those who contribute their own sperm and those who rely on donor sperm. While these differences may be most pronounced when prospective social fathers are compared during the prenatal period, differences may persist for some fathers even after birth. I suspect that men who experience the combination of fertility circumstances listed in the 5th scenario will be most likely, among those men using donor sperm, to have a strong sense of a paternal identity. They will be able to draw upon their bond with their partner and her own contribution to the conception, gestation, and actual birth process to reinforce their own pre and post-natal paternal identity and actual involvement with their children once they are born (Humphrey & Humphrey, 1988). Their partner's expectations for them to be a supportive partner during gestation will help remind them of their emerging father roles.

Those men included among the 6th scenario of cases may tend to feel somewhat alienated during gestation because they have not contributed their own sperm and have probably been unable to play an active part in the pregnancy process (rare exceptions to this pattern probably occur when family or friends serve as surrogate mothers). It is possible that the symbolic significance to social fathers of having their partner carry the pregnancy to term versus using a donor's ovum may be very different for those men who rely on a donor's sperm compared to those who use their own. Men may place greater weight on their partner's genetic contribution when they are unable to make a similar contribution themselves. What does seem clear is that some men facing these fertility circumstances will probably have to struggle to develop a paternal identity during gestation.

Men categorized according to the criteria for the 7th category may tend to have the second strongest sense of having a paternal identity among those who use donor sperm. They will probably have a more intense sense of being a prospective father during the pregnancy than men depicted in the 6th category. While men in the 7th scenario depend upon a donors' sperm and ovum, their partner is responsible for carrying the fertilized egg to term. Consequently, the man is able to be a daily witness to the pregnancy process and may even have the opportunity to visualize the fetus using ultrasonography. Aspects of the man's procreative consciousness are likely to be reinforced repeatedly as he and his partner experience the daily interaction rituals (including lamaze classes) that usually attend the pregnancy process when shared by two people who have actively tried to have a child. Many of these men will also have an opportunity to accompany their partner during the labor and delivery process.

Of the eight permutations, the final one most closely reflects the dynamics of parenthood through adoption. Those rare cases where men depend on donated sperm, a donated ovum, and a surrogate carrier for the pregnancy, will typically include men with the least well-develop paternal identity. This should be especially true during the pregnancy. Men who become social fathers under these circumstances may still be quite committed to their father roles but they will have a greater chance to feel unsettled about their paternal identity than those who either made a biological contribution to their child's birth directly, or at least indirectly via their partner's genetic or gestational contribution.

In contemplating some of the social and psychological implications of reproductive technologies for men, as well as those related to the eight specific permutations outlined above, several interrelated questions come to mind (for related questions see Edwards, 1991). When are men most likely to feel financially and emotionally obligated to "their" children who are conceived using reproductive technologies? What kinds of changes occur among men in different circumstances regarding their pre and post-natal perceptions and feelings? What factors affect men's perceptions of their child and their own paternal roles when their relationship with the child's mother dissolves? Does an examination of men's responses to modern reproductive innovations reveal connections between aspects of men's procreative consciousness and their sense of procreative responsibility?

Implications for Children

Reproductive innovations may have consequences for children as well as for their fathers. However, since many more children than fathers will be unaware that alternative reproductive techniques played a role in their conception and birth, a smaller proportion of children than fathers will be affected directly. An important factor that needs to be taken into account when discussing the development of these children is whether or not they are aware of the circumstances surrounding their conception. The types of questions that researchers can address will obviously vary depending upon whether children have been informed of the nature of their conception and birth. At this point in time, families that include children conceived through asexual reproductive techniques have not been subjected to careful study so it is only possible to speculate about their socioemotional development (see Snowden, Mitchell, & Snowden, 1983; Iizuka, Swada, Nishina, & Ohi, 1968).

Children conceived and born as a result of one of the modern reproductive innovations, especially those involving donated sperm and/or ova, might have different familial experiences and self-perceptions when compared to children who have been reproduced naturally. This would be consistent with evidence that shows that adoptive and foster families often have different familial dynamics than those traditional families where a husband and wife live with their naturally conceived children (Humphrey & Humphrey, 1988). However, Snowden et al. (1983) concluded based on their nonrepresentative study of 57 couples using donor semen that all of the spouses:

> appeared to have accepted the children willingly and happily; indeed some of the fathers had a particularly close relationship with their children and appeared to be deeply involved in child care and family life. Because their children had been achieved after considerable heartache, and after much effort, they were particularly valued and loved and the couples tended to find parenting particularly rewarding and satisfying (pp 82; cited in Humphrey & Humphrey, 1988: 141).

Differences might also exist between children representing the eight permutations depending upon which set of fertility circumstances were used to reproduce them. For those who are aware that they are the product of IVF or AI techniques, differences may be due to how children

interpret the specific set of fertility circumstances surrounding their origins. Some of these children may have unresolved questions about their birth parent(s) that are similar to those adopted children experience (for a discussion of adoption issues see Humphrey & Humphrey, 1988). While it might be possible to draw some conclusions about these children's feelings by extrapolating from studies using adopted children, the comparison is confounded by the fact that adopted children will probably have a greater tendency to feel that they were abandoned as infants by a genetic and gestational mother as well as a genetic father in many cases. Children born with the aid of modern reproductive innovations will not experience this anxiety and may even feel special because their parents went to such great lengths to have them (Snowden et al, 1983).

In general, it would seem reasonable to assume that individuals conceived and born according to the circumstances described in the first case scenario listed in Figure 1 would differ very little if at all from their counterparts who were reproduced naturally. Those who would be most likely to feel anxious about their identity would probably be those who were conceived using both donor sperm and ovum. Those who were conceived with the genetic contribution of one of their social parents would probably not be quite as concerned about their identity as those whose genetic composition excludes both of their social parents. However, I suspect that those who know only half of their genetic heritage will still be at greater risk of feeling uneasy about not knowing anything about their biological father (or mother) than children who know their complete genetic heritage. It is possible that knowing that one's social mother was also one's gestational mother may reinforce a child's tendency to feel at ease with his/her lack of genetic heritage with his/her parents.

It would be instructive to place any observed differences between children in context by considering the details about how and when they learned about the nature of their conception. Whatever these difference may be, I suspect that they will be minimized if children feel as though their parents have loved them.

If researchers were to study those children who were not aware of their unique origins they might examine whether parents treated these children any differently than naturally conceived children (their own or others) and how this treatment has affected their children's development. Knowing how fathers (and mothers) felt and currently feel about their children conceived with

the assistance of alternative reproductive techniques would be useful information for theoretical as well as therapeutic reasons. A related direction for research would be to consider whether these perceptions were associated with differences in paternal conduct.

Although doing research on this subset of children is very enticing, researchers would probably need to overcome stiff opposition to study this latter group of children. It would be exceedingly difficult to enrol parents in the project due to their fears that their children might inadvertently discover the truth about their origins. Their concerns are probably well founded since some evidence has shown that adoptive children who find out accidently about their adoption are often traumatized (Holbrook, 1990).

Without these data it is difficult to offer well-informed advice to parents about their options for disclosing information to their child about the fertility circumstances surrounding his/her conception. As I noted above, children's general concerns and insecurities are likely to be a function of both the nature of the circumstances and children's perceptions about their social parents' love for them. It seems sensible to argue that those permutations that deviate the most from the natural reproductive process may increase a child's chances of feeling unsettled and perhaps being stigmatized by peers if they were to discover the truth. At the very least, I imagine that some children would be alarmed that they were not biologically related to someone whom they had always perceived as their father or mother. The risk associated with disclosure would probably be highest when he/she is most impressionable and subject to teasing from peers, and should subside as the child matures. When the child is older, a compelling argument could be made in support of either being perfectly honest with him/her or choosing to preserve the fictive reality. Therapists involved with adoptive families are likely to espouse the former approach since they typically recommend that parents inform their child when he/she is roughly between the ages of 8-12 (Humphrey & Humphrey, 1988; Myers, 1994). Counselling parents who have used donor sperm, though, appears to be a more complicated process as is evidenced by the Humphreys' equivocation as to whether partners should disclose this information to their children. They are concerned, for instance, that the father may risk being socially stigmatized by the infertile label if others were to discover the truth.

DNA Fingerprinting and Paternity Establishment

Modern technology not only makes it possible for many individuals to have children in novel ways, it provides the means to determine whether two people are related genetically as well. Although this technology has been used rather sparingly, it is widely available and has become a political asset for those who wish to increase the rate of establishing paternity for children born to single women. Their major objective is to increase the chances for these children to receive adequate financial child support (Wattenberg, 1993).

The primary use of DNA testing thus far has been to determine the validity of a mother's claim that a particular man is the biological father of her child. The threat of being forced to take such a test can prompt some men to acknowledge their paternity without contesting the matter further. In order for this technology to be used in those cases where a man does not voluntarily acknowledge his paternity a woman must willingly identify a particular man (or several men) as the genetic (or probable genetic) father to the proper authorities. It is far less common, though not unheard of, for a man to use DNA testing as a means of establishing his biological and legal relationship to a child. Older children, sometimes adults, may also request that a paternity test be performed if they are curious about their origins.[8]

This technology, when viewed from a sociohistorical perspective, offers the possibility of eliminating the time honoured custom whereby men have chosen to trust women not to deceive them about their paternity status. While men in theory will no longer have to accept their partner's word, and women need not rely simply on normative pressure to persuade a former sexual partner to acknowledge his paternity and accept the accompanying obligations, the practical reality is that trust is likely to remain an essential feature of the reproductive process. The vast majority of males are not going to question their paternity status, and only a very small proportion of women who have multiple sexual partners but are in an established relationship, will request that several men take a paternity test to determine the child's progenitor. Other women will be reluctant to use DNA fingerprinting to establish paternity because they want to preserve their autonomous control over their child and minimize their own involvement with the child's father.

Summary and Conclusion

It appears that a small but growing proportion of men living in industrialized countries will be directly affected by the increased availability and use of modern reproductive technologies and biosocial innovations. While financially comfortable middle-class men are likely to remain the principle users of IVF technology (sometimes in combination with surrogacy), increasing numbers of middle-class and less affluent men may experiment with the relatively less expensive AI procedure without surrogacy (Issacs & Holt, 1987). I have commented briefly on how these developments may help to shape significant moment in the history and definition of fatherhood and "family." In the absence of data, I applied my social psychological framework that broadly conceptualizes men's relationship to the reproductive realm to speculate about the nature of men's experiences with these reproductive innovations. Men's orientation toward reproductive issues will affect the way they perceive and experience each of the eight permutations I outlined based on the different options individuals have for the genetic and gestational contributions needed to reproduce a child. Likewise, men's actual involvement with one of the techniques and the accompanying fertility circumstances they encounter may affect their procreative consciousness and sense of responsibility.

At the heart of this discussion are questions related to men's beliefs and attitudes about biological procreation and social fatherhood. As Meerabeau (1991) notes, it has typically been the case that the phrase "to father" has meant to procreate whereas "to mother" has been associated with a longer term, nurturing image (see also Rothman, 1986). To the extent this image resonates with particular men, they will probably feel significantly different about their paternal identity when they are able to contribute their own sperm rather than using donor sperm. For some fathers (perhaps many), biological paternity may be a critical factor that shapes their perception of their role as a prospective father during gestation and as a social father after their child's birth as well (see Crowe, 1985; Overall, 1987). Meanwhile, research on infertile couples suggests that middle class men are less likely than comparable women to feel devastated by their (couple's) inability to reproduce a child (Greil, 1991). Thus, compared to women, men may place greater weight on having a genetic connection with their child, but they seem to become less upset about their own infertility, or the prospects of being a part of an infertile couple.

Another issue central to my discussion involves the indirect route fathers take in defining their commitment to their paternal identity by linking it to their involvement with a romantic partner (Furstenberg, 1988; Marsiglio, 1993). Partners may often play a role in affecting fathers' procreative consciousness and sense of responsibility. Thus some men who use reproductive innovations to become social fathers may tend to experience their paternal identity by drawing on their association with their partner and her pregnancy experiences. This discussion raises a key question: To what extent do men's views about reproductive technologies and their paternal identity stem from their negotiated interactions with their partner rather than their own more general orientation toward procreation?

In some instances these reproductive innovations will provide men with their only opportunity to experience biological paternity. When they are used successfully they will also give all men a chance to experience their social roles as fathers. As more men adopt alternative forms of reproduction, especially those that depart most radically from the natural reproductive process, the need for researchers to understand men's relationship to this aspect of the reproductive realm will grow accordingly. Research with these men, though fraught with methodological difficulties in some cases, will enable researchers to assess how men relate to unique aspects of the reproductive realm and define fatherhood. In particular, scholars will be able to examine the relationship between men's perceptions of biological paternity, social fatherhood, and their expression of their social roles as fathers. Comparative analyses are needed to examine the extent to which fathers in various cultures/subcultures differ in the value they associate with biological paternity. These issues, though significant in their own right, will take on greater importance if they are found to be related to children's well-being.

Footnotes

[1] While the title of this paper and some of the language herein suggests that I am dealing with "modern" or "new" innovations, in some cases these reproductive technologies have been available (especially in animal husbandry) for some period of time. Their widespread use, however, is a relatively recent phenomenon and they have continued to be perfected over the years (Issacs & Holt, 1987; McNeil, Varcoe, & Yearley, 1990).

[2] There are actually three forms of artificial insemination: (AIH) artificial insemination by husband (or partner), (AID) artificial insemination by donor, and (AIC) which represents a combination of the first two types.

[3] Many authors refer to this technology as "ovum transfer (OT)," but technically the ovum is fertilized outside the woman's body and a five-day-old embryo is then transferred to the woman. Another technology, "gamete intrafallopian transfer" (GIFT) enables fertility specialists to place through laparoscopy a sperm and eggs directly into one or both fallopian tubes of the gestational mother--the normal cite of human fertilization (see Edwards, 1991; Issacs & Holt, 1987).

[4] Unlike the DNA fingerprinting test, earlier tests (ABO blood-typing system, Human Leukocyte Antigen (HLA) tissue-tying test) can only be used to exclude an alleged male from being identified as a particular child's father (Howe, 1993). I will restrict my comments to the DNA fingerprinting test.

[5] While I list the practice of surrogacy as a biosocial innovation, and in the process implicitly acknowledge that its practice is typically associated with the medical community, this process (in combination with self-insemination) can and has at times been used by individual women without the assistance of the medical community (Issacs & Holt, 1987; McNeil, 1990).

[6] "The reproductive realm encompasses the variety of physiological, social-psychological, and interpersonal phenomena that are associated with fertility regulation, gestation, and procreation broadly defined. This comprehensive definition takes into account a male's perception of his responsibility to his offspring prior to and after their birth, as well as the symbolic meaning that fathering and raising children has for him" (Marsiglio, 1991, 285).

[7] The development and increasing use of innovations in reproductive technology overlaps the recent development of contraceptive technology--the second major moment in the history of reproduction according to O'brien (1981). These earlier (an ongoing) technological developments have provided women (and men) a greater opportunity to exert control over their reproductive potential without abstaining from coitus.

[8] I am familiar personally with one case in which a man in his late 20s is currently thinking about taking this test in order to establish whether a man he suspects may be his biological father is in fact related to him. The man's mother apparently has never been certain which of two men were responsible for her son's conception and she only recently informed him of this dilemma.

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Figure 1: Eight Permutations for IVF and AI Among Heterosexual Couples

Scenario ID	Sperm*		Ovum		Gestation Body	
	Own	Donor	Partner	Donor	Partner	Surrogate
1	x		x		x	
2	x		x			x
3	x			x	x	
4	x			x		x
5		x	x		x	
6		x	x			x
7		x		x	x	
8		x		x		x

Male's Own Sperm

1. own sperm, partner's ovum, partner's body
2. own sperm, partner's ovum, surrogate mother's body
3. own sperm, donor's ovum, partner's body
4. own sperm, donor's ovum, surrogate mother's body

Donor's Sperm

5. donor's sperm, partner's ovum, partner's body
6. donor's sperm, partner's ovum, surrogate mother's body
7. donor's father's sperm, donor's ovum, partner's body
8. donor's sperm, donor's ovum, surrogate mother's body

* In some cases a semen specimen includes both a contributing father's sperm and sperm from a donor. I have excluded this variable from the table because it occurs rarely and makes the conceptualization less manageable with no significant gain in understanding. Inclusion of this permutation would increase the total number of permutations to 12.

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